1. A process for producing particulate solid titanium dioxide comprising:

(a) reacting gaseous titanium tetrachloride and oxygen to produce particulate titanium dioxide and gaseous reaction products in an oxidation reactor; and

(b) quenching the particulate titanium dioxide and gaseous reaction products by injecting an essentially inert quench fluid into a zone in the reactor where the reaction is essentially complete and titanium dioxide particles are no longer growing in size, wherein the quench fluid is injected at a pressure of less than 75 psig above the reactor pressure, and at a temperature significantly less than the temperature of the reaction products at the zone of injection.

2. The process of claim 1 further comprising cooling the quenched titanium dioxide particles and gaseous reaction products by passing the quenched titanium dioxide particles and gaseous reaction products through a tubular heat exchanger.

3. The process of claim 2 wherein the quenched titanium dioxide particles and gaseous reaction products are made to follow a spiral path as they flow through the tubular heat exchanger.

4. The process of claim 1 wherein the quench fluid is an essentially inert gas selected from the group consisting of chlorine, nitrogen, carbon dioxide, oxygen, hydrogen chloride, noble gases, and mixtures thereof.

5. The process of claim 1 wherein the quench fluid comprises cooled, recycled gaseous reaction products from which titanium dioxide has been separated in the process.

6. The process of claim 5 wherein the recycled gaseous reaction products have a temperature of from about -152° F to about 200° F at the point of injection into the reactor.

7. The process of claim 1 wherein the quench fluid has a temperature of from – 328° F to about 200° F at the point of injection into the reactor.

8. The process of claim 1 wherein the quench fluid is an essentially inert gas that has been cooled sufficiently to transform to a liquid phase prior to injecting into the reactor.

9. The process of claim 1 wherein the quench fluid is injected into the reactor in an amount of about 0.1 pound to about 5 pounds per pound of titanium dioxide.

10. The process of claim 1 wherein the quench fluid is injected into the reactor at a pressure in the range of from about 0.1 psig to about 75 psig above reactor pressure.

11. The process of claim 1 wherein the quench fluid is injected into the reactor at a point or points in the reactor that are about 10 ft to about 40 ft downstream of the point in the reactor where oxygen and titanium tetrachloride are first reacted.

12. A process for producing particulate solid titanium dioxide comprising:

(a) reacting gaseous titanium tetrachloride and oxygen to produce solid particulate titanium dioxide and gaseous reaction products in an oxidation reactor;

(b) quenching the particulate titanium dioxide and gaseous reaction products with a recycled stream of gaseous reaction products which has been previously cooled by injecting a portion of the cooled recycled stream of gaseous reaction products into a zone in the reactor where the reaction is complete and titanium dioxide primary particles are no longer growing in size, said recycled gaseous reaction products being injected at a pressure of less than

75 psig above the reactor pressure, and at a temperature significantly less than the reactor temperature at the zone of injection;

(c) cooling the quenched particulate titanium dioxide and gaseous reaction products in a tubular heat exchanger;

(d) separating the cooled particulate titanium dioxide from the cooled gaseous reaction products; and

(e) recycling a portion of the cooled gaseous reaction products, from which the titanium dioxide has been removed as in step (d), to the reactor to provide the quench as called for in step (b).

13. The process of claim 12 wherein the recycled gaseous reaction products are at a temperature of about 32 ° F to about 200° F at the point of injection into the reactor.

14. The process of claim 12 wherein the recycled gaseous reaction products are injected into the reactor in an amount of about 0.1 pound to about 5 pounds per pound of titanium dioxide.

15. The process of claim 12 wherein the recycled gaseous reaction products are further cooled using a tubular heat exchanger prior to injecting into the reactor.

16. The process of claim 15 wherein the recycled gaseous reaction products are cooled to a temperature of about -152° F to about 150° F prior to injecting into the reactor.

17. The process of claim 12 wherein the recycled gaseous reaction products are injected into the reactor at a pressure in the range of from about 0.1 psig to about 75 psig above reactor pressure.

18. The process of claim 12 wherein the recycled gaseous reaction products are injected at a pressure of less than about 30 psig above reactor pressure.

19. The process of claim 12 wherein the recycled gaseous reaction products are injected into the reactor at a point in the reactor that is about 10 ft to about 30 ft downstream of the point in the reactor where oxygen and titanium tetrachloride are first reacted.